

Using Williams Sound/AV Infrared Products for Air Wall Applications

DESIGN GUIDE

Air Wall Systems consist of a large area with walls that can be moved to accommodate different events. Some events may use the whole room, while others may have separate rooms, each with their own audio program. When the walls are moved, a control system (using a matrix switcher) routes audio to the emitters being used.

This document provides examples of infrared (IR) system designs for use in large divisible room applications where Assistive Listening or Language Translation is required. Venues include Hotel Ballrooms, Convention Centers, Houses of Worship, and others.

Advantages of using Infrared (IR) technology in Air-Wall Systems

Infrared offers advantages over other technologies (such as FM) in large divisible (air-wall) rooms.

1. **SECURITY:** Infrared stays contained within the room. People outside the room cannot hear the broadcast.
2. **SIMPLICITY:** Since one channel is used, listeners do not have to change channels, regardless of the room used.
3. **EXPANDIBILITY:** Any number of rooms, and any configuration is possible as long as enough IR coverage is provided.
3. **FLEXIBILITY:** The system can be used for assistive listening, audio description and language interpretation.

Before Starting a Design - Assumptions and Considerations

Assumptions:

1. Each room (formed by moving walls) will be equipped with a minimum of one emitter panel.
2. All emitters will be mounted on non-removable walls.
3. Emitters installed in the outer rooms will be sufficient to supply signal to the inner rooms when the walls are opened.
4. Emitters in the inner rooms will be turned off when the walls are opened (see consideration #1, below).

Considerations:

1. Williams AV emitters **automatically turn off**, after a time, when **no audio signal** is present. This eliminates the need to **manually** turn the emitters off. This can be accomplished by having the RF matrix switcher shut off it's output(s) to the unused emitter(s), or the audio sources can be powered off, or the mixer outputs can be muted.
2. Williams AV IR emitters **can** support up to four RF channels simultaneously. However, when multiple channels are used, each additional channel decreases the range (output strength) of a single emitter. This document uses one RF channel per emitter to provide the greatest coverage.
3. Emitter transmission patterns need to be considered when specifying the emitter mounting locations. The Williams AV TX-9 has a three-lobed pattern. See the TX-9 specifications for it's coverage pattern and range.
4. The MOD 232 Infrared Modulator has a limit of six TX-9 emitters per RF carrier/output, and this combination is typically used in very large venues where greater coverage is needed. In this document, one RF channel is routed to each emitter, providing maximum coverage per emitter.
5. The size of the audio matrix switcher (number of inputs and outputs) depends on how many unique audio programs will need to be running at the same time. See FIGURE F which shows a typical eight-space configuration.

Designing an IR System for a Divisible (Air-Wall) System

Room Layout Overview

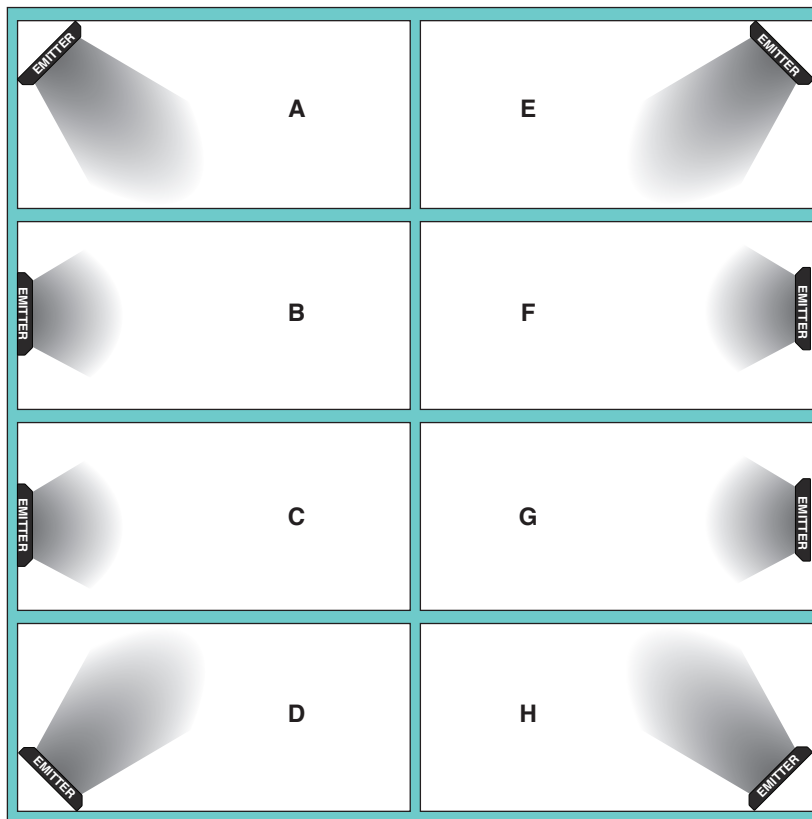
In this document we will use a large venue (such as a Convention Center) containing an air wall system with eight room partitions. One emitter is installed in each of the four corners of the convention center and one emitter is installed on the interior wall of the convention center for each interior room. The emitters are installed permanently - they do not need to be moved when the walls are reconfigured.

The shading is shown for general emitter direction only; see emitter specifications for actual transmission patterns and range.

(FIGURE A)

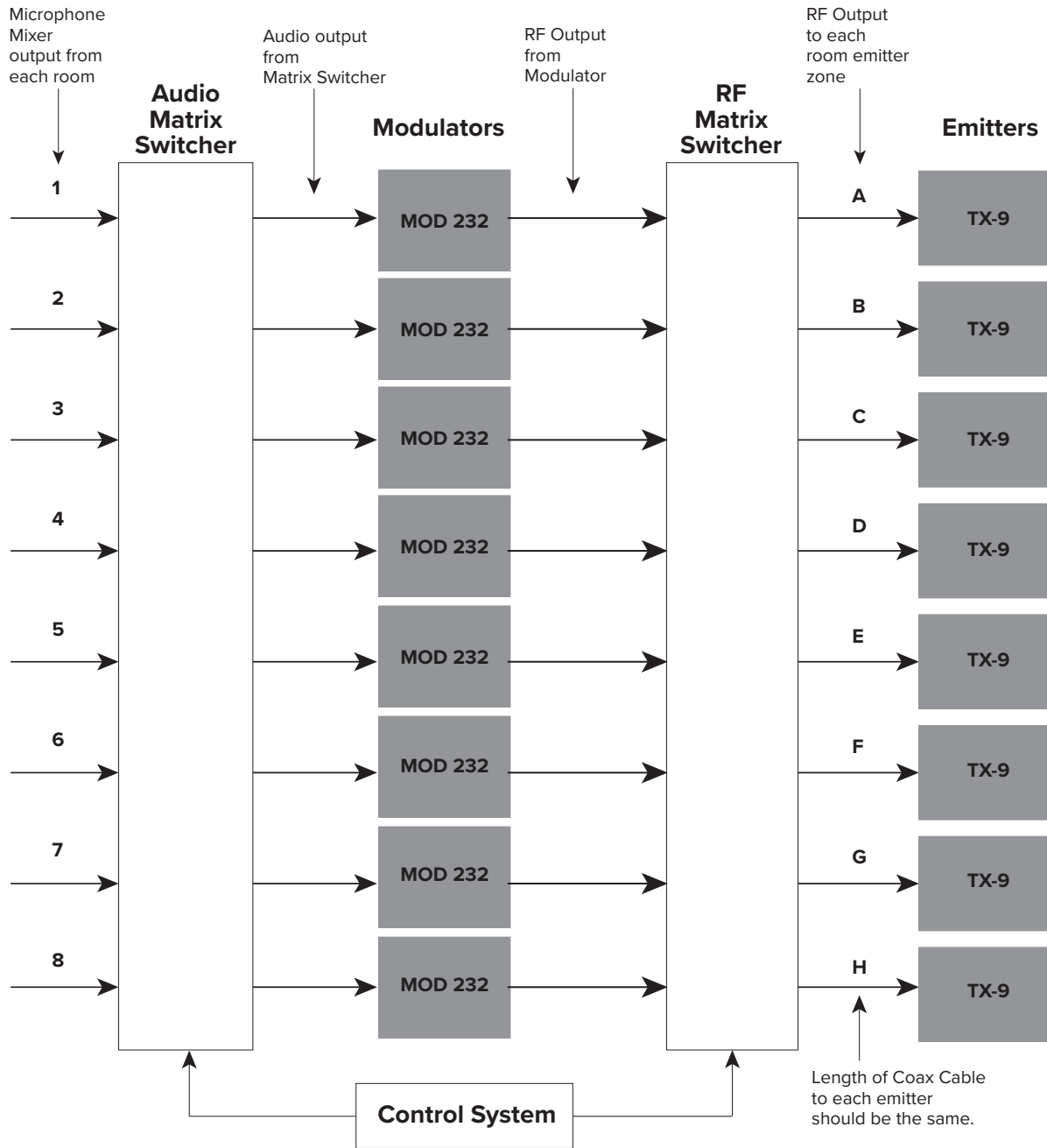
Equipment Configuration Overview

FIGURE A: EMITTER INSTALLATION FOR LARGE VENUE WITH 8 ROOM PARTITIONS



The following diagram shows how the equipment would be connected for the eight-room air wall system. This illustration is for general equipment configuration and signal path only, no routing is shown here. (FIGURE B)

FIGURE B: BASIC HARDWARE CONFIGURATION



■ Williams AV Product

Equipment List

- (8) Audio Sources or Mixers
- (1) 8x8 Audio Matrix Switcher
- (8) Williams AV MOD 232 Infrared Modulators
- (4) RPK 006 Dual Rack Mount Kits or 8 RPK 005 Single Rack Mount Kits (optional)
- (1) 8x8 RF A/V Matrix Switcher
- (8) Williams AV WIR TX-9 Emitters
- (1) Control System (Crestron, AMX, Extron, etc)
- Williams AV WIR RX-15, WIR RX-18, or WIR RX 22-4 Infrared Receivers (as needed)
- Williams AV earphones, headphones, or neckloops (as needed)

Microphone/Audio Mixer

In each room, wall jacks for a Microphone and Aux source are sent to some type of Mixer. Many mixer choices are available, so there is no brand/model recommendation here, other than the mixer output must be compatible with the Audio Matrix Switcher. Each mixer output is fed into a dedicated input on the Audio Matrix Switcher shown on the left side of the diagram. (Note the microphone/audio mixer and audio matrix switcher may be combined in one unit depending on make/model).

Audio Matrix Switcher

The Audio Matrix Switcher takes each Microphone/Audio Mixer audio and routes it to the desired modulator, depending on room configuration. Companies like Crestron, AMX, Extron and others all have Audio Matrix Switchers that can work well in this application. (Note the microphone/audio mixer and audio matrix switcher may be combined in one unit depending on make/model).

IR Modulator (Williams AV model MOD 232)

Each output of the Audio Matrix Switcher is connected into one infrared modulator. The IR modulator creates an RF carrier frequency (like 2.3 MHz), inserts the audio program onto the carrier, and outputs this RF signal to the RF matrix switcher.

In this example, 8 programs can be routed to any of the 8 rooms, or 4 programs to 4 rooms, or one large room with one program. Note that the MOD 232 comes equipped with a power supply.

Optional Rack Mount Kits (Williams AV part numbers RPK 005, RPK 006)

An RPK 005 can be used to mount a single MOD 232 in a single rack space.

An RPK 006 can be used to mount 2 MOD 232s side-by side in a single rack space.

RF Matrix Switcher (Crestron, AMX, Extron, etc.)

The RF output of each infrared modulator is connected to one input of the RF matrix switcher. Each output of the RF matrix switcher is connected to one emitter. In this example, an 8x8 switcher can route any of the eight audio programs to any of the eight rooms. Note that in most applications, some type of display (like a video projector) may be used, so this switcher will often be a full audio/*video* matrix switcher.

IR Emitter (Williams AV model TX-9)

Each output of the RF Matrix Switcher is sent to one room emitter. The TX-9 is used here because of its 3-lobed transmission pattern. By placing one TX-9 in each of the four corners, the lobed transmission pattern helps fill the corners of the room. When the walls are open, the transmission pattern fills the larger area. When the walls are closed, less of the transmission pattern is used, and the emitter floods the area with signal. Note that the TX-9 comes equipped with 100 ft of RG-58 cable and a wall-mount.

Control System

When the walls are moved, a trigger (such as a contact closure at each removable wall location, or a command from a keypad) tells the control system which walls are open. A live microphone/mixer input tells the audio switcher which modulator to use. The control system tells the RF matrix switcher to send each audio/mixer signal to the emitters needed for the new room configuration, and shuts off the outputs to the unused emitters. After a period with no signal, the emitters time-out and shut off. The typical control system would consist of a processor (and/or matrix switchers) made by as Crestron, AMX or Extron.

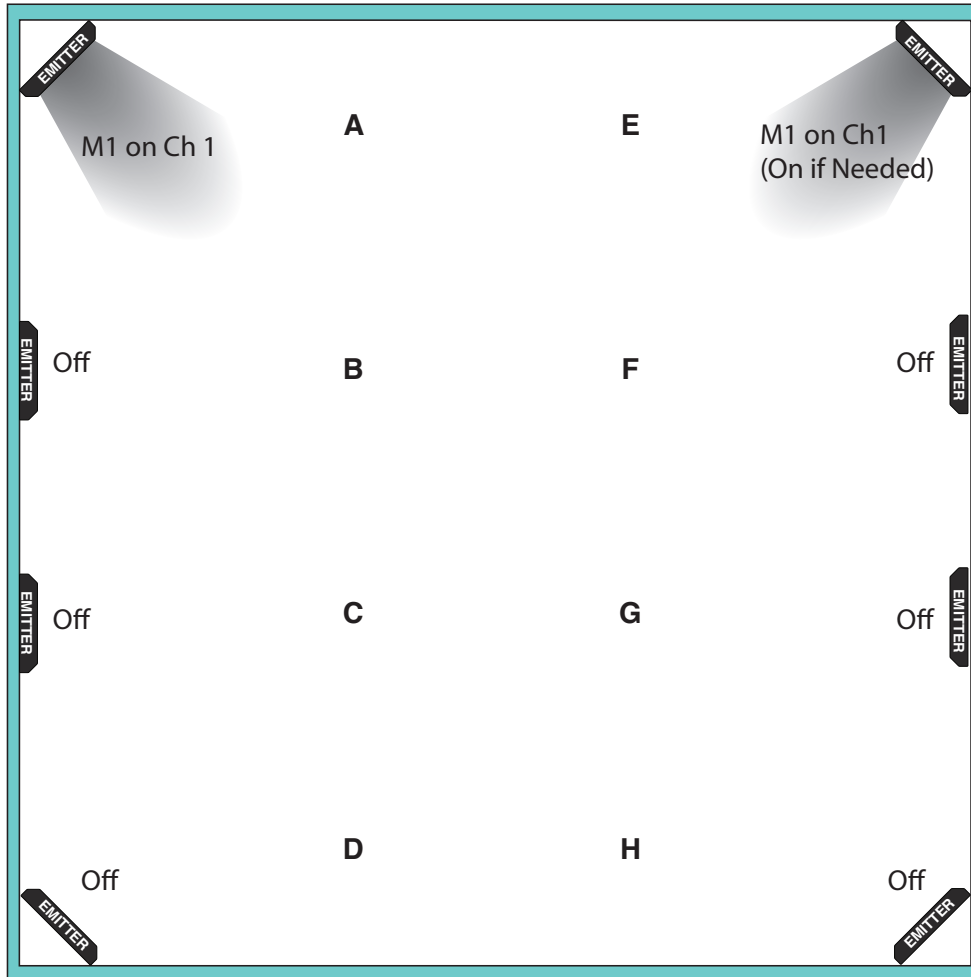
Important Note about Cabling

All emitters should be home-run to the RF Matrix Switcher with the **same cable length** for best transmission performance. Daisy-chaining emitters is not recommended. The best way to accomplish this is to take the **longest** run length and make the rest of the runs that same length. On the shorter runs, excess coax can be coiled up.

Example 1: One Room with One Audio Program

In this first example, all of the walls are removed. This configuration is used when one audio program is needed, such as a speaker giving a presentation to a large audience in one large space. Each person has a receiver set to the same channel, and hears the presenter through emitter A. Additional emitters can be turned on as needed for adequate coverage. (FIGURE C)

FIGURE C: ONE LARGE ROOM WITH ONE AUDIO PROGRAM

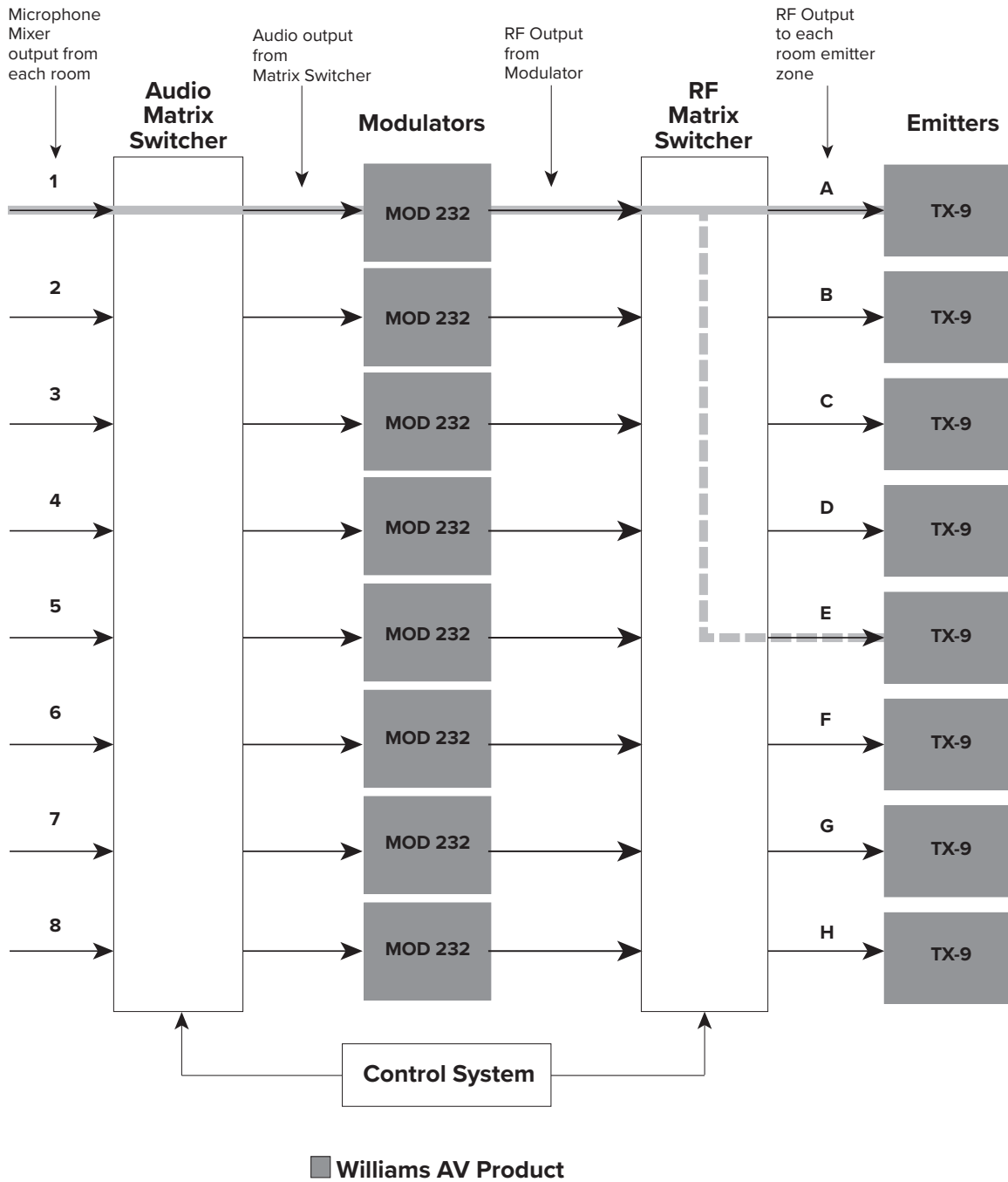


In this case the matrix switcher routes the audio to the main emitter, and audio can also be routed to a slave if additional coverage

is required.

See the shaded routing path for Emitter A. If more coverage was needed, Emitter E could also be turned on by having the matrix switcher also route the program to Emitter E. All receivers are set to Ch1 (2.3MHz). (FIGURE D)

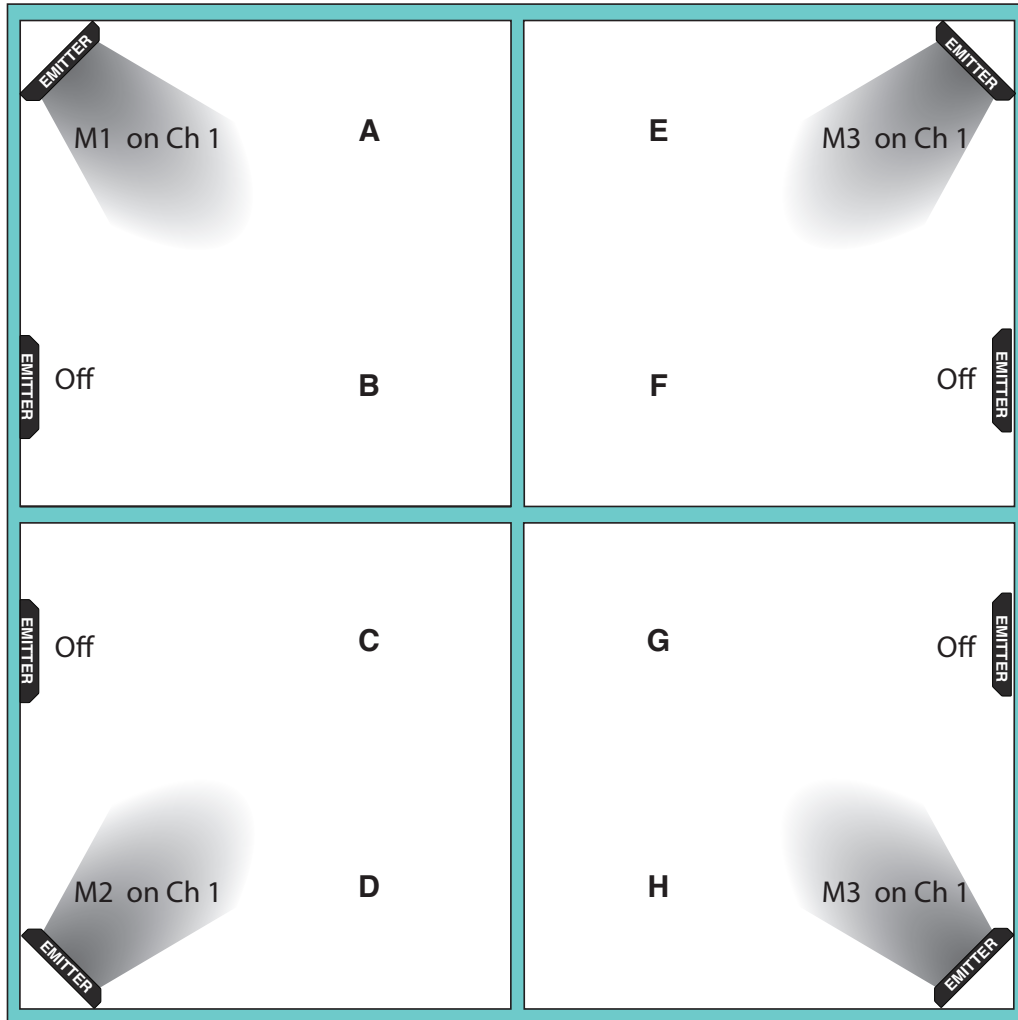
FIGURE D: ROUTING FOR ONE ROOM WITH ONE AUDIO PROGRAM



Example 2: Four Rooms with One Audio Program in Each Room

Four air walls are moved into position to create four rooms. This configuration is used when four rooms need to be used simultaneously, but each room needs its own audio program. All users use the same receivers, all set to Channel 1. Any receiver will work in any room, and there is no need to change channels. (FIGURE E)

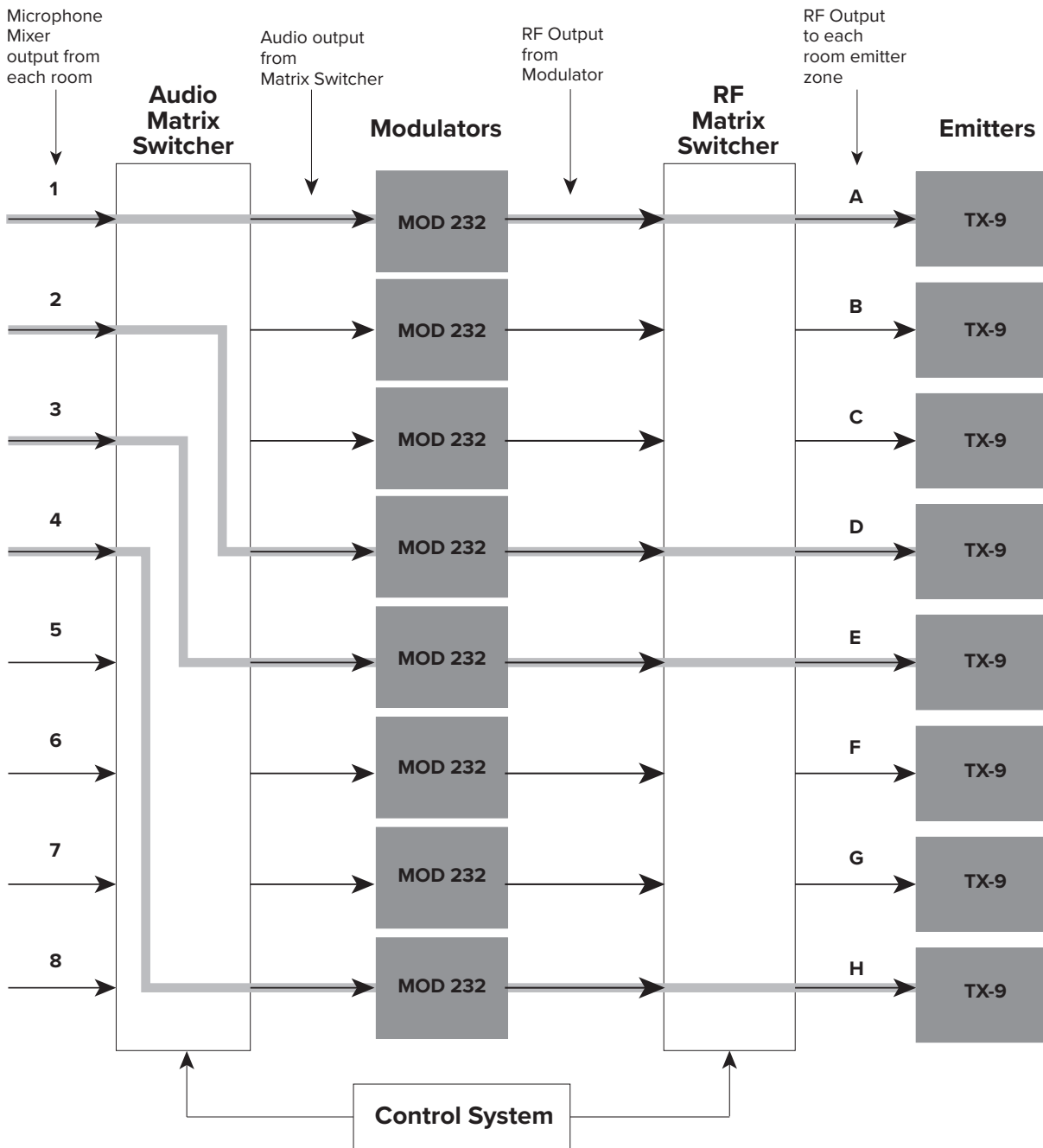
FIGURE E: FOUR ROOMS WITH INDIVIDUAL PROGRAMS



In this case the audio matrix switcher routes one audio input to each of the four modulators. Each modulator output is routed to one emitter.

Each room has its own audio program, each broadcast on 2.3 MHz. The matrix switcher routes microphone mixers 1-4 to the appropriate modulators for distribution to each of the rooms. The matrix switcher shuts off the signal to all unused emitters. (FIGURE F)

FIGURE F: ROUTING FOR 4 ROOMS WITH 4 INDIVIDUAL PROGRAMS

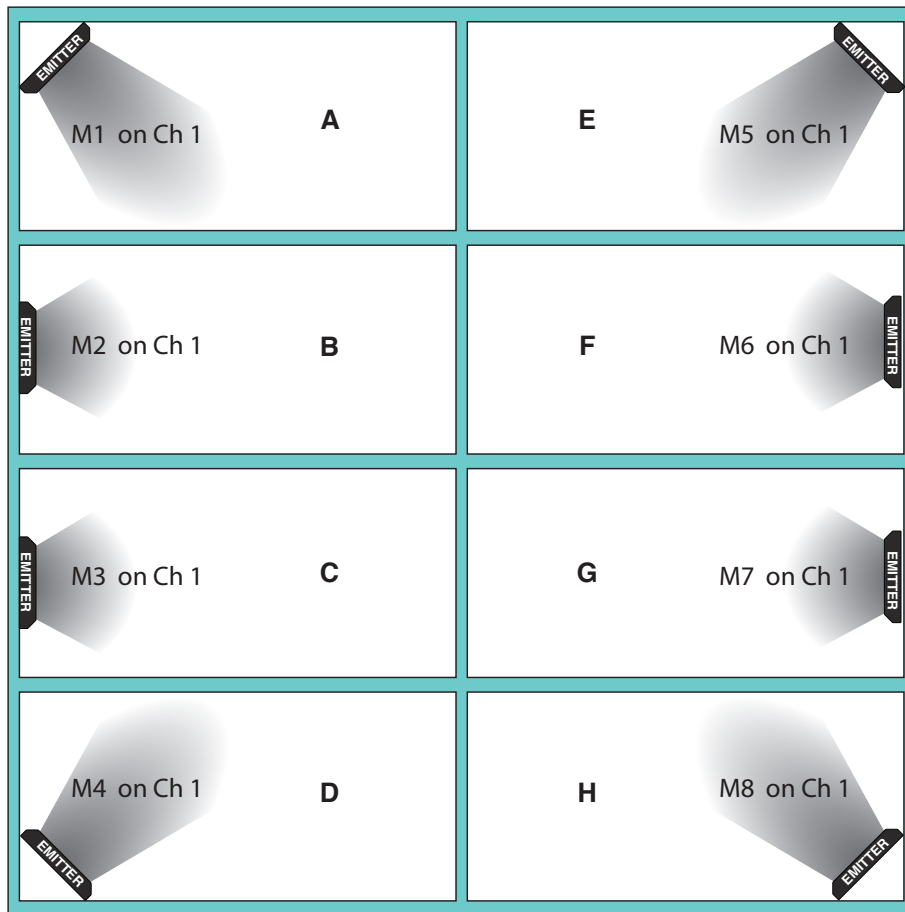


■ Williams AV Product

Example 3: Eight Rooms with Individual Audio Programs

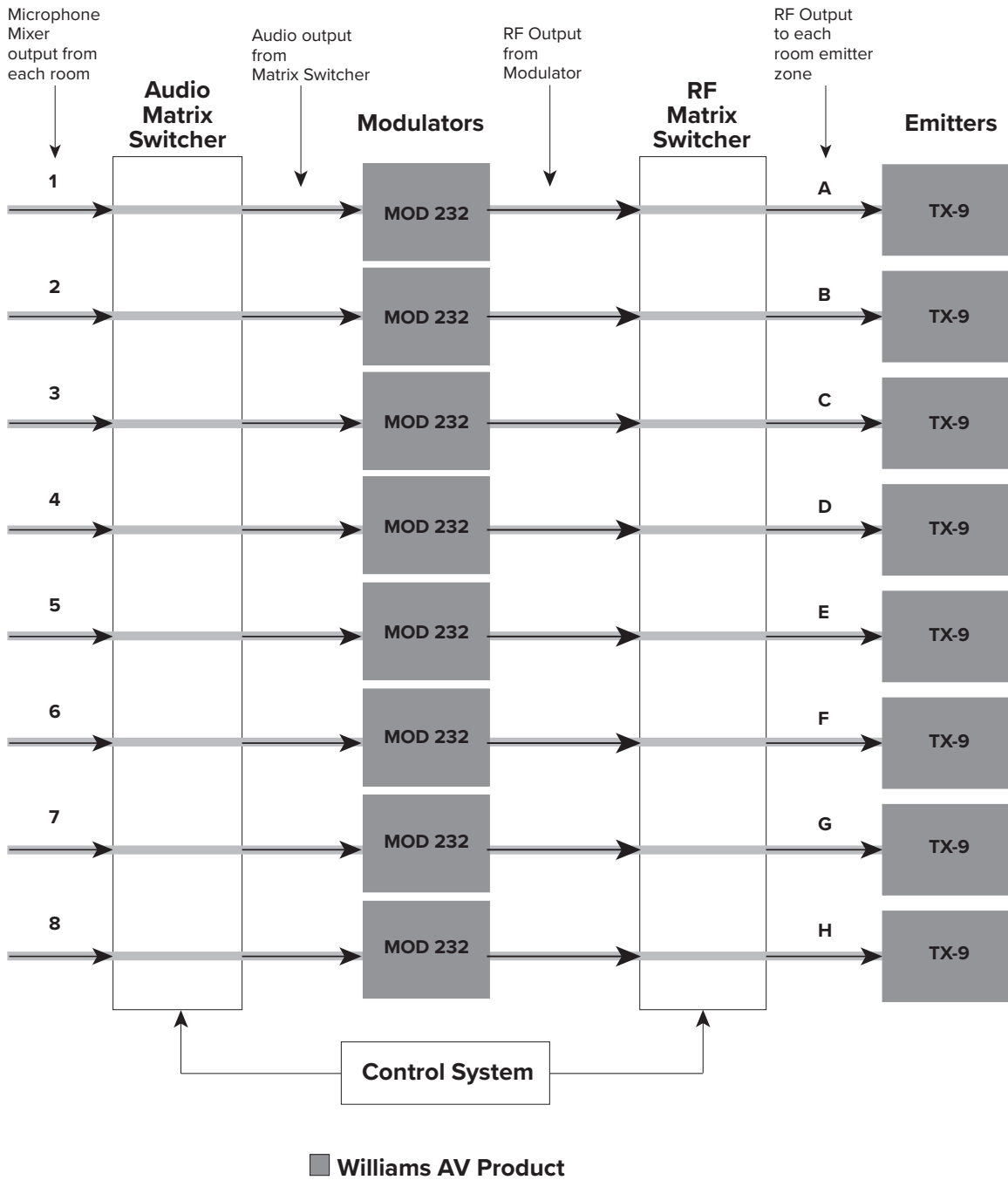
All of the air walls are moved into position to create eight rooms. Each room has its own program. All users use the same receivers, all set to Channel 1. Any receiver will work in any room, and there is no need to change channels. (FIGURE G)

FIGURE G: EIGHT ROOMS WITH INDIVIDUAL AUDIO PROGRAMS



Each audio program is routed to the emitter for that room. In this case the routing is "one-to-one" (no matrixing). (FIGURE H)

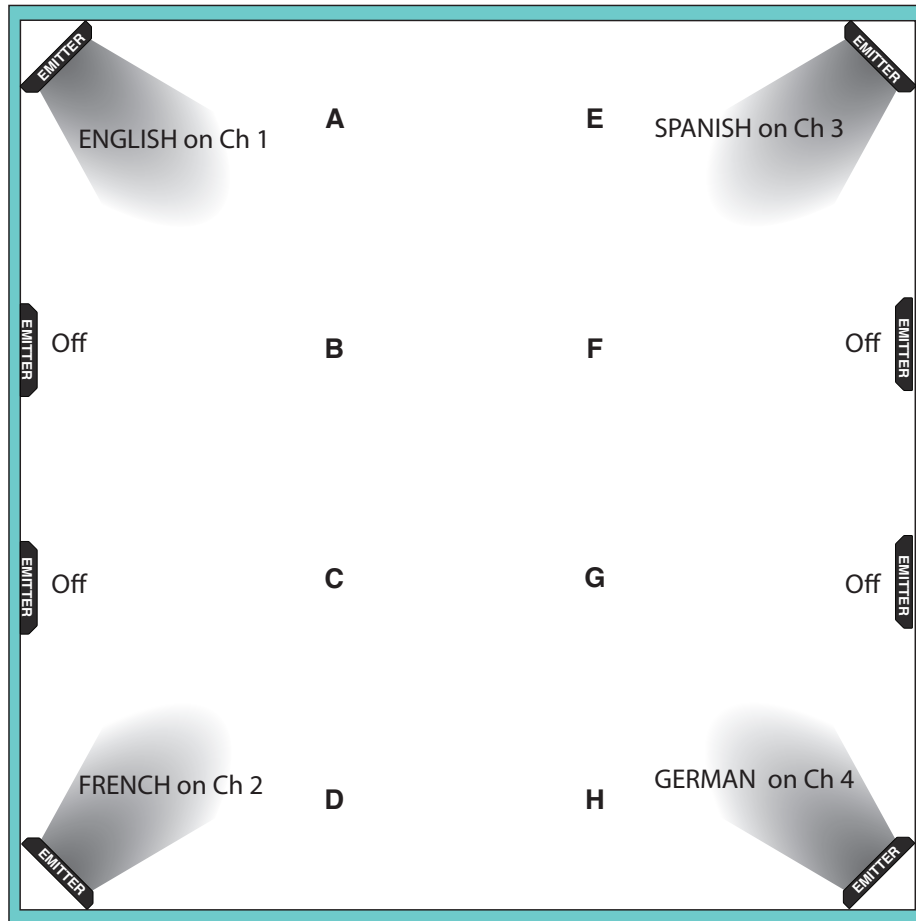
FIGURE H: ROUTING FOR 8 ROOMS WITH 8 AUDIO PROGRAMS



Example 4: Language Interpretation System using Four Languages

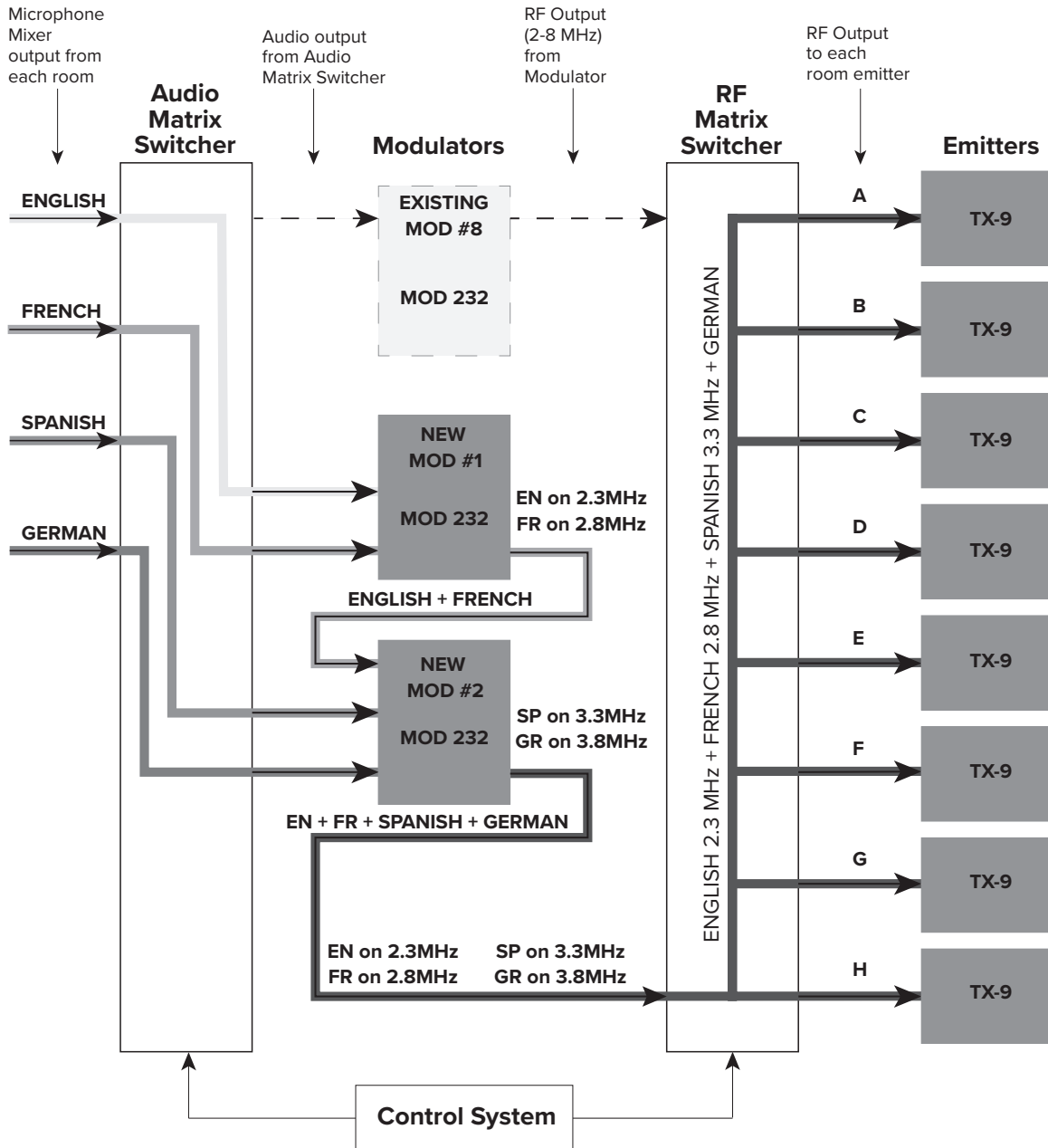
The Convention Center is opened up into one large room. Four languages need to be simultaneously broadcast. The listener changes the receiver to the channel for the language they want to hear. (FIGURE I)

FIGURE I: ONE LARGE ROOM WITH FOUR LANGUAGES



In FIGURE I, the system had eight modulators and eight emitters. In another possible configuration, two additional modulators could be added and daisy-chained together to combine all four languages on one emitter. In this case, the listener would need to change to the channel for the language they want to hear. This example requires a larger audio matrix switcher and larger RF matrix switcher to accommodate the additional modulators. (FIGURE J)

FIGURE J: HARDWARE CONFIGURATION AND ROUTING FOR FOUR LANGUAGES FROM ONE EMITTER



Williams AV Product

WILLIAMS AV

info@williamsav.com / www.williamsav.com
800-843-3544 / INTL: +1-952-943-2252

©2019 Williams AV • All Rights Reserved TCH 001D